

At 500 and 100 mb., although the quasi-biennial oscillation is intermittent and weak in magnitude, progression is still evident. Tentatively, at these levels, the wave appears to originate in subtropical latitudes in the vicinity of 80°W. of both hemispheres and progresses both eastward and westward, occurring last in the Indian Ocean. The entire progression time generally ranges from 1 to 2 yr.

Due to the irregularity at these levels and slow speed of the QBO between stations, it is sometimes quite difficult to trace corresponding maxima and minima on a global basis. It is quite possible that the QBO at 100 and 500 mb. has a cellular rather than a continuous pattern of phase progression. Analyses of additional stations will clarify the interpretation. In general, interpolation uncertainties at 500 and 100 mb. are somewhat larger than at 50 mb. The decrease in magnitude of the QBO with decreasing altitude is not completely compensated for by the increase in the number of observations available for analysis at the lower levels. However, the results may still be more significant at the lower levels than at 50 mb. because of the much longer transit time of the QBO between stations.

The above analysis apparently does not indicate any new properties that confirm or deny either an external or internal origin of the QBO in the atmosphere. Rather, it shows the natural irregularity in the atmosphere at low frequencies that of course has been observed many times at shorter time scales.

Future work includes the expansion of the analysis to higher latitudes and other levels utilizing a more dense station network to obtain better continuity and to help identify corresponding waves.

It is recommended that a series of long-term, scientific, upper air stations be arranged carefully along a few

chosen latitudes and one meridian to obtain more compatible, accurate and complete data concerning this global phenomenon whose properties are still poorly described and whose cause is still completely unknown. Perhaps after 10 or 20 yr. with such data its properties can be described properly.

#### REFERENCES

1. R. J. Reed, "The Present Status of the 26-Month Oscillation," *Bulletin of the American Meteorological Society*, Vol. 46, No. 7, July 1965, pp. 374-387.
2. H. E. Landsberg, J. M. Mitchell, Jr., H. L. Crutcher, and F. T. Quinlan, "Surface Signs of the Biennial Atmospheric Pulse," *Monthly Weather Review*, Vol. 91, No. 10-12, Oct.-Dec. 1963, pp. 549-556.
3. G. M. Shah and W. L. Godson, "The 26-Month Oscillation in Zonal Wind and Temperature," *Journal of the Atmospheric Sciences*, Vol. 23, No. 6, Nov. 1966, pp. 786-790.
4. J. K. Angell and J. Korshover, "Harmonic Analysis of the Biennial Zonal-Wind and Temperature Regimes," *Monthly Weather Review*, Vol. 91, No. 10-12, Oct.-Dec. 1963, pp. 537-548.
5. G. E. Edmond, "An Analysis of Tropical Stratospheric Winds by Means of a Band Pass Filter Technique," *Meteorological Magazine*, Vol. 94, No. 1119, Oct. 1965, London, pp. 304-308.
6. L. S. Gandin, "Objective Analysis of Meteorological Fields," (Translated from Russian book, *Gidrometeorologicheskoe Izdatel'stvo*, published in Leningrad, 1963), Israel Program for Scientific Translations, Jerusalem, 1965, 242 pp.
7. D. P. Peterson and D. Middleton, "Linear Interpolation, Extrapolation, and Prediction of Random Space-Time Fields With a Limited Domain of Measurement," *IEEE* (Institute of Electrical and Electronic Engineers, Inc.) *Transactions on Information Theory*, Vol. IT-11, No. 1, New York, Jan. 1965, pp. 18-29.
8. C. E. Buell, "Two-Point Variability of Wind," *Kaman Nuclear Report*, (AFCRL-62-889), No. KN-173-62-2 (FR), Vol. 1-3, Kaman Nuclear, Colorado Springs, Colo., July 1962, 152, 205, and 165 pp.
9. H. Cramer, *Mathematical Methods of Statistics*, Princeton University Press, N.J., 1961, 575 pp.

[Received January 11, 1968; revised May 1, 1968]

#### NOTICE TO AUTHORS

Miles F. Harris, Chief of the Scientific Review Group in ESSA's Scientific Information and Documentation Division, was appointed Editor of the *Monthly Weather Review* on September 1, 1968. The January 1969 number (Vol. 97, No. 1) will be the first issue under his editorship. Manuscripts and correspondence should be addressed to:

MILES F. HARRIS, *Editor*  
 Monthly Weather Review  
 Scientific Information and Documentation Division  
 Environmental Science Services Administration  
 Rockville, Maryland 20852